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Engineering Newsletter

NATIONAL ASSOCIATION OF EDUCATIONAL BROADCASTERS

14 GREGORY HALL

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URBANA, ILLINOIS

TV TECHNICAL TIPS (July)

—CECIL S. BIDLACK

On May 28th, the Federal Communications Commission extended the date for compliance with paragraphs 3.690 and 3.691 of Part 3 of its rules governing Radio Broadcast Services. This extended date is June 1, 1959. These are the paragraphs which require television transmitters to have frequency and modulation monitors. In its release, the Commission stated that with the continued development of more stable frequency control circuits in all types of broadcast transmitters (AM, FM, and TV) it is consider-

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propriate rulemaking proceeding will be initiated.

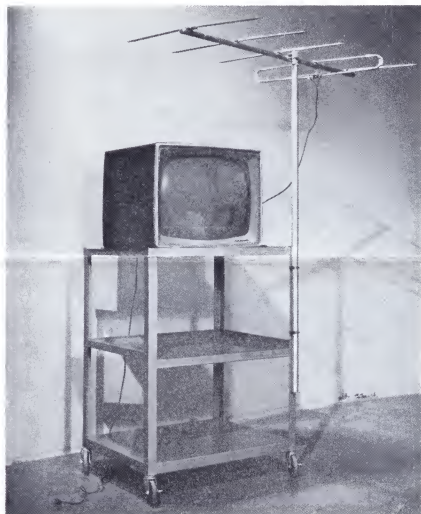
On June 9th the Commission also adopted an amendment to its rules for non-commercial educational FM stations regarding its CONELRAD rules concerning these stations. Section 3.573 (b) has now been amended to refer educational stations to the appropriate section 3.1003 (a) of CONELRAD rules rather than to the commercial FM remote control rules as formerly.

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Our picture for this month illustrates a "boomobile" developed by John Boor of KCTS in Seattle, Wash., for use in schools in their area. The antenna is readily demountable and is at a height of approximately 6½ feet so that persons of ordinary height do not bump their heads on it. The five-element Yagi antenna for channel 9 is of commercial make as well as the cart, so that total cost of cart and antenna is around \$25.00.

In addition to the picture Boor has supplied us with a list of what he considers highly desirable features for a TV receiver to be used in a classroom:

- 1) Flat tinted glass, tilted forward over the picture tube.
- 2) Four-inch beveled light shield around the picture tube.
- 3) Front speaker, eight-inch minimum.
- 4) Long heavy AC cord.
- 5) Cart with large rollers.
- 6) Yagi type demountable antenna on 6½-foot mast.



ing a review of its requirements on the continued use of such apparatus. Should it appear that the rules relating to such monitors need to be amended, an ap-

- 7) Simple operation from *front*.
- 8) Twenty-one-inch screen.
- 9) Controls on *back* for all adjustments—height, width, H and V line centering; H and V hold, etc.
- 10) High definition video circuits—five hundred lines.
- 11) Transformer power supply with paralleled filaments.
- 12) RF—video switch for air or closed circuit use.
- 13) Separated audio input.
- 14) Loop AC from set to set.
- 15) Loop audio from set to set.
- 16) Loop video from set to set.
- 17) Frequency corrected audio—curtailed below 200 N.
- 18) Five-watt minimum audio output.

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We'd like to call your attention to the April 1958 *RCA Broadcast News* as it contains a number of items of interest for both radio and television engineers. This issue contains a detailed description of how the RCA Videotape Recorder operates, as well as articles on automation in television programming, precision offset TV carrier operation, design of a combination control room/announce booth in addition to the usual descriptions of radio and television equipment installations. Technical details of a new 500 - 1000 watt am transmitter, a 2 kw VHF television transmitter, a universal coaxial transmission line, and a new ultra-directional television microphone are also included.

TV TECHNICAL TIPS (August)

In almost every television station operation, occasions have arisen when the intercommunication between the director and the cameraman is not loud enough to overcome ambient noise. Donald K. Haahr, of the WOI-TV staff, sends along the methods used there to overcome this difficulty as developed by two of their engineers, Thomas F. West and Leo E. Runge.

The two most obvious program offenders are sportscasts and musical productions. Quick camera changes during the climax are important, yet this is usually the time of most program volume. Our illustrations show two of the three methods used at WOI-TV to assure its cameramen getting necessary instructions in spite of program or crowd noise.

The first step in this improvement was to construct a bracket which mounts the microphone assembly of a Western Electric Type 52 AW headset to a war surplus double cushion headset (see photo):



The WOI-TV crew likes them because they offer intercom to both ears, at the same time blocking unwanted sound from the normally used ear. They are rugged and they are more comfortable, especially in cold weather.

The second step was to incorporate an amplifier at the director's position which fed a higher talk level to the intercom circuit. The talk voltage was raised from the usual .5 volt normal level to approximately 3.0 volts, which is about the maximum, above which cross talk may be observed in the video circuits of the camera cable. The addition of a key switch allows the director to have the line audio amplified on his headset alone. One disadvantage is that the director's mike is amplified in his own ear piece.

As a result of this second step it became evident that it would be desirable to have an amplifier at each headset location with its own volume control; in this way the audio in the intercom circuit could be normal mike level. The third step was to build a transistor amplifier in a $2\frac{1}{4}'' \times 2\frac{1}{4}'' \times 4''$ aluminum minibox shown on the panning handle of the camera. The power supply is self-contained and to date the batteries have lasted over three months using them about three hours per week on remote pick-ups. The cost of materials is less than ten dollars per unit.

If you'd like to complete constructional details of these amplifiers including a parts list, schematics and

the layout of the plexiglass panel mounting the components (see photo), we'll be glad to mail them to you upon request.

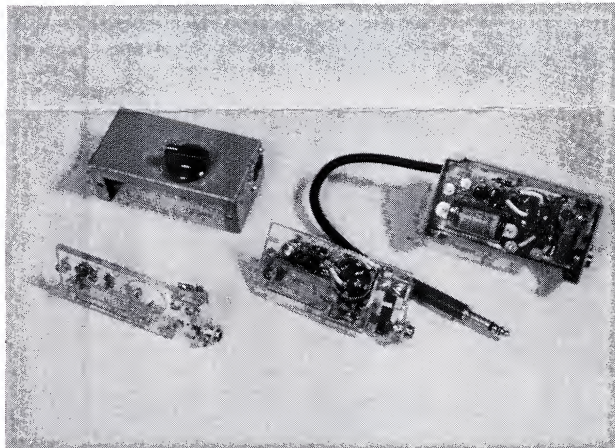
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We are also in receipt of a brochure, from Mr. Haahr of WOI-TV, of a color television recording and reproducing system developed by Dr. William Hughes of the Iowa State College Experiment Station. The system uses 35mm black and white film. Electronically, the brochure states, the ICS system is not much more complicated than current black and white film chains. Mechanically, it is much simpler than even the simplest black and white film chain since it uses a continuous (non-intermittent) film movement. If you wish the brochure on this color television recording and reproducing system, write to the Director, Engineering Experiment Station, Iowa State College, Ames, Iowa.

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There's an excellent article in the June 1958 *RCA Broadcast News* by John H. Roe, titled "How to Get Good Picture Quality from the TK-15 Studio Vidicon Camera." This paper discusses the use of the new 7038 vidicon and tabulates the important points to remember to obtain maximum picture quality. It also tabulates steps in camera set-up procedure. The importance of lighting is stressed as well as the necessity for correct adjustment of target voltage, beam current, illumination and lens openings to give maximum signal to noise ratio, low lag, depth of focus and normal output. The article has been reprinted and is available from RCA upon request.

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The B.B.C. has developed a video tape recording system which they call Vision Electronic Recording Apparatus. The May 1958 technical issue of the *E.B.U. Review* contains a paper by Dr. P. E. Axon of the Engineering Research Dept. of the B.B.C. which gives technical details of this equipment.

The B.B.C. version uses 1/2-inch wide magnetic tape running at a tape speed of 200 inches per second, thus a 20 1/2-inch reel of tape is required to record a 15-minute program. Three tracks are laid down longitudinally on the tape, two of the tracks record the video signal and the third track records the accompanying sound. The three heads are mounted in a single stack so that sound is in sync with picture. A second head stack permits continuous monitoring of sound and picture.

In the B.B.C. system, the video signal is split into two frequency bands, 0—100 kc and 100 kc - 3 mc. The 0—100 kc video band frequency modulates a carrier which is recorded on one track. The higher video band from 100 kc - 3 mc is recorded on the second video track in a conventional manner. The audio signal also modulates an FM carrier of 250 kc.

In the recording mode, a servo system locks the speed of the capstan to the frequency of the 50 cycle AC supply by use of a light source, photo cell-de-amplifier combination. In the reproduce mode, the speed of the capstan is controlled by comparing the recorded 50 cycle synchronizing signals with the TV station's sync signals to derive a correction voltage.

In addition to an erase head, there is also a cueing head which has been added to assist in editing taped programs. This editing system is subject to further development. At present the cue head is fed through a separate recording amplifier from a 30 kc oscillator.

This frequency is used as a "marking" device by pressing a "cue" key at the point desired for cutting. This causes a 30 kc burst to be recorded on the sound track, which does not interfere with the subsequent playbacks of the tape at normal tape speed. This "mark," however, does produce an audible signal when the tape is moved slowly past the reproducing head to provide a

way of finding the point marked. The 30 kc signal may also be modulated by a voice signal giving editing instructions or it can be AM modulated by vertical sync pulses so that the precise cutting point on the tape may be located. A splicing jig is provided to assure accuracy in joining the cut ends of the tape together.

* * * * *

While we are not aware of any educational FM station using multiplex transmission, in the future this type of transmission might well be used in stereophonic broadcasting. The FCC is taking another look at multiplexing and attempting to determine whether additional uses are feasible, appropriate, or should be permitted in the FM band. Written comments are invited covering seven specific applications of FM multiplex under Docket No. 12517. These should be filed on or before September 2, 1958.

* * * * *

We have an equipment "buy" for an educational station planning to go on a reserved UHF channel. This is equipment for a complete UHF TV station and includes the following:

- 1) One Continental 1 kw UHF transmitter (Chan.)
- 18) Diplexer and approximately 400 feet of transmission line
- 2) One G. E. Helical antenna
- 3) Two GPL Image Orthicon Camera chains
- 4) One GPL PA 505 Vidicon Film Camera
- 5) Two GPL PA 100 16mm projectors

It also includes sync generator, switcher, master monitors and other miscellaneous equipment. This station was in operation until June 20, 1958 and the equipment is being sold on an as is, where is, condition. The price is \$25,000 for the lot. If you are interested in the purchase of this equipment contact the writer of this column.

TV TECHNICAL TIPS (September)

On July 31, the FCC adopted a new policy regarding the operation of private television microwave links. We quote the new statement of policy:

"Television broadcast station licensees will have the option of operating their own private television intercity relay facilities or obtaining intercity television transmission service from communications common carriers in all cases except those in which a direct interconnection is desired with common carrier facilities. Such relay stations are not to be used as intermediate links in common carrier intercity television transmission facilities."

The above ruling means that it will now be possible for educational stations to build state or regional networks regardless of the fact that common carrier service is available to serve the stations or cities interconnected. In the past, private facilities were authorized, however once the common carrier facilities were available to provide the service, they were obligated to use it regardless of the fact that their own microwave links were providing a satisfactory service at a much lower annual cost.

The Commission, in announcing this policy, stipulates that "the use of frequencies for intercity relaying shall be on a secondary basis and subject to the condition that no harmful interference is caused to television pickup and television STL stations". At the present time, there are about 50 private MCW links in use including those at ETV stations in Alabama and North Carolina.

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In another action adopted July 30, the FCC proposed rule making in Docket No. 12567 to permit television translator stations to operate with a maximum power of 100 watts whereas the present maximum power output of these translators is 10 watts.

Around 125 translators are now in operation, having been authorized by the Commission in May 1956. At that time, power output was limited to 10 watts until data upon actual operation could be obtained. In the two years which have elapsed since this authorization, the FCC has received no reports of interference between translators or other services. Since numerous requests have been received to increase power output, the Commission believes that consideration should be given to permit this increase since the additional power will improve the service now being provided as well as bringing service to new areas where there is little or no TV reception.

Translators retransmit the signals of another television broadcasting station or another translator by direct frequency conversion to the top 14 channels (70 to 83) of the UHF television band.

A note from Hartford Gunn of WGBH, Boston, states that their Ampex Videotape Recorder is now installed and in operation. He reports that their biggest problem to date is how to keep down traffic on the machine.

— N A E B —

WILL-TV is looking for a used GPL image orthicon camera chain as well as an iconoscope film chain. They have some large screen RCA television projection equipment to trade for the above. If you are interested in making a swap, contact Rob R. Beldon,

chief engineer, WILL-AM-FM-TV, University of Illinois, Urbana, Ill.

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In answer to the rising need for standardization of video tape recording practices in the television industries, Mr. Axel G. Jensen, Bell Telephone Labs, Engineering Vice-President of the Society of Motion Picture and Television Engineers has announced the formation of a Video Tape Recording Engineering Committee, by the Society.

The official scope of the committee, which will be chaired by Mr. Howard A. Chinn, CBS Television, will be "To propose standards and good engineering practices for the construction, operation and measurement of video tape recording and reproducing equipment and for those video tape or other characteristics which affect performance and interchangeability."

Initially, the committee plans to consider standardization in the following areas: tape (dimensions and identification), tape reels (hub and flange), tape tracks (locations, video-, audio-, control-, and cue-tracks), recorded signal electrical characteristics (video, audio, control and cue), tape leaders, methods of measurement, terminology and tape splicing.

The committee will be composed of engineers experienced in the areas of tape manufacturing, equipment manufacturing and broadcasting. It will also have liaison with other organizations in the television and related fields. The committee has already started preliminary investigation into all the areas tentatively established within the scope of its activities.

A live educational radio network in New England became a reality last month with the first regular broadcasts by WEDK, Springfield, Mass., of programs from WGBH-FM, Boston.

The Educational Radio Network, in effect, joins educational institutions at both ends of Massachusetts in cultural programming which can be received by FM listeners throughout Southern New England. It is expected that station WAMC, at the Albany (N. Y.) Medical College of Union University, will join the E.R.N. this year, thereby providing coverage for upstate New York and Vermont.

As a key affiliate of the E.R.N., station WEDK will broadcast many of WGBH-FM's programs, as well as local programs some of which will be fed to the network.

WEDK is licensed to the Springfield School Committee and is operated with the cooperation of the Western Massachusetts Broadcasting Council, Inc. The station, which has been conducting tests since early spring, successfully completed trial broadcasts

from its Springfield transmitter before it was linked with WGBH-FM.

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Honors as the first city to be allocated two educational TV channels go to Pittsburgh, Pa. after last month's F.C.C. ruling.

The Commission shifted Chan. 22 from Clarksburg, W. Va. to Pittsburgh for educational use. In a counterproposal, the Metropolitan Pittsburgh Educational Station requested use of Chan. 16 instead of Chan. 22; however, decision on this proposal will not come until later this month.

Pittsburgh's present ETV station, WQED, Chan. 13, now programs almost 12 hours daily and has been in operation since April, 1954. It requested an additional channel in order to enlarge its educational program for both classroom and home instruction and for specialized educational service to industries and professions in the Pittsburgh area.

ETV STATIONS ON THE AIR

KCTS	Seattle, Wash.	9
KETA	Okla. City, Okla.	13
KETC	St. Louis, Mo.	9
KLSE	Monroe, La.	13
KNME	Albuquerque, N. M.	5
KOAC-TV	Corvallis, Ore.	7
KQED	San Francisco, Calif.	9
KRMA-TV	Denver, Colo.	6
KTCA-TV	St. Paul, Minn.	2
KUED	Salt Lake City, Utah	7
KUHT	Houston, Tex.	8
KUON-TV	Lincoln, Neb.	12
WAIQ	Andalusia, Ala.	2
WBIQ	Birmingham, Ala.	10
WCET	Cincinnati, Ohio	48
WETV	Atlanta, Ga.	30
WGBH-TV	Boston, Mass.	2
WHA-TV	Madison, Wis.	21
WHYY-TV	Philadelphia, Pa.	35
WILL-TV	Urbana, Ill.	12
WIPR-TV	San Juan, P. R.	6
WKNO-TV	Memphis, Tenn.	10
WMVS-TV	Milwaukee, Wis.	10
WOSU-TV	Columbus, Ohio	34
WQED	Pittsburgh, Pa.	13
WTHS-TV	Miami, Fla.	2
WTIQ	Munford, Ala.	7
WTTW	Chicago, Ill.	11
WTVS	Detroit, Mich.	56
WUNC-TV	Chapel Hill, N. C.	4
WYES-TV	New Orleans, La.	8

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